

[Sub] [0001] A co-pending application entitled "Structures and Methods for Aligning Fibers", having application number 09/825,821, filed on 4 April 2001, is hereby incorporated herein.
[bk]

In order to explicitly define the word "apparatus" according to its already demonstrated usage throughout the specification and claims, replace paragraph 0002 on page 1 with the following amended paragraph:

[X] [0002] This invention generally pertains to methods for adding process integration to the manufacture of fiber optic apparatuses implemented with side-polished fiber optics. This invention also pertains to integrated apparatuses made from these methods of manufacture. Note that the word "apparatus" as used in this disclosure does not mean bare, un-altered, fiber-optic fiber, but rather one or more fiber-optic fibers with at least one of the fibers structurally altered from its original, generally circular or elliptical, cross-sectional shape (e.g. by side-polishing) and/or made to interact optically with another fiber over a finite length of fiber.

In order to correct two patent numbers in paragraph 0003 (which begins on page 1 and continues to page 2), replace paragraph 0003 with the following amended paragraph:

[X] [0003] There is no prior art method or apparatus published, or on the market, for fully utilizing the advantages of integrated processes with silicon to manufacture side-polished fiber optic apparatuses and systems, other than the photomasking of multiple features such as grooves, or the deposition of coatings. What is known in the prior art deals with individually placing fibers in grooves, one-at-a-time. Once placed they may all be polished in one step. This prior art is limited to the manufacture of side-polished fibers to implement two-port photonic functions. This known art is taught in the U.S. patents 5,781,675 "Method for preparing fiber-optic polarizer" and 5,809,188 "Tunable optical filter or reflector", both by Tseng. In those patents, Tseng teaches the use of a set of parallel and variable-depth V-grooves etched in a common silicon crystal substrate to simultaneously achieve both a) precise control of remaining side-wall thickness left on each fiber held within each of the V-grooves, b) arcuate paths for the fibers which enable the side-polished regions to be of a controlled length, and c)

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simultaneous deposition of one or more films on the set of side-polished regions. Not taught in the above patents are multi-function apparatuses or methods for manufacturing multiple apparatuses on a common fiber without fuse splicing or physical connectors. Also not disclosed are a) methods or apparatuses for fabricating multiple units simultaneously, other than the substrates themselves or 2-port polarizers or filters; b) methods or apparatuses wherein some multiples of individual apparatuses are formed with at least one fiber in common; or c) any methods or apparatuses for fiber-to-fiber alignment when coupling side-polished areas to one another between fibers in respectively different substrates.

In order to add another mention to an earlier referenced patent, replace paragraph 0042 on page 16 with the following amended paragraph:

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[0042] The last portion of the process is depicted by FIG. 2I. FIG. 2I shows the substrates 31 and 58 parted, leaving a freestanding, bonded 4-port coupler 59. What is not shown is that prior to parting the two substrates 31 and 58, the replacement bonding material holding the end portions of the fibers 42 and 54 into place in their respective substrates 31 and 58 is first loosened by a solvent or by heating. As a freestanding 4-port coupler 59, its two fibers 42 and 54 are now affixed together but free of the substrates 31 and 58. Note that the substrates 31 and 58 may now be reused to make yet another such apparatus. This potential reuse of the silicon substrates can significantly lower the cost of producing 4-port couplers. This separation of a fiber optic apparatus from a substrate also removes thermal expansion mismatch issues as mentioned in the above referenced US patent 4,475,790 by Little, titled "Fiber optic coupler".

Amendments To Claims

Cancel claims 21-36.

Amend claims 1 and 2 to the following:

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1. (amended) A multiple fiber optic apparatus comprising:
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